

## **SIRTF Telescope Optical Engineering**

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### **ABSTRACT**

The Space Infrared Telescope Facility (SIRTF), a cryogenic infrared observatory planned for launch around the turn of the century, will span the 2.5-200  $\mu\text{m}$  spectral waveband during its operation in an earth-lagging *heliocentric* orbit. The environmental conditions and mass constraints for SIRTF present challenging requirements to the optical engineer. The SIRTF telescope is cryogenically cooled to liquid helium temperatures and exposed to a launch environment. Thus, the Optical Telescope Assembly (OTA), which incorporates the primary and secondary mirrors and its support structure, must retain alignment after cooldown, launch vibration, and gravity release. Also, mass requirements indicate the use of lightweight primary mirror technologies for SIRTF. This yields challenging mirror surface figure and mounting requirements. Candidate primary mirror substrates for SIRTF are fused silica, beryllium, and silicon carbide. Each material has its set of trade-offs. This paper presents these telescope engineering issues and how the SIRTF telescope technology plan addresses them in order to facilitate the final design.